# HL Answers to hybridization questions

**1.** In ethene both carbon atoms are $sp^2$ hybridized whereas in ethane they are both $sp^3$ hybridized. Ethene contains five σ bonds and one π bond. In ethane there are seven σ bonds and no π bonds.

**2.** The hybridization changes from $sp^3$ to $sp^2$. (This allows for much greater conjugation in the cation and hence explains why phenolphthalein is coloured in alkaline solution.)

**3.** The nitrogen atom in ammonia is $sp^3$ hybridized. Both nitrogen atoms in hydrazine are also $sp^3$ hybridized. In the hydrazone the nitrogen atom bonded to carbon is $sp^2$ hybridized and the remaining nitrogen atom in the $–NH_2$ group is $sp^3$ hybridized.

**4.** The carbon atom in HCN is sp hybridized. It is also sp hybridized in the nitrile but is $sp^2$ hybridized in the carboxylic acid.

**5.** $BeCl_2$ is a linear molecule as the central Be atom has two electron domains (two bonding pairs of electrons) so beryllium is sp hybridized in beryllium dichloride, $BeCl_2$.